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DIGITAL TRANSFORMATION OF EDUCATION: EDUCATIONAL AND METHODOLOGICAL PROBLEMS AND WAYS TO SOLVE THEM

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Abstract. Starting with the history of computers and the process of mass computerization, the rapid development of the Internet and the possibilities of mobile communication form the basis of digitalization, which is the core of basic research and multilateral discussions as a scientific concept in Industry 4.0. New tools and digital technologies, such as educational collaboration platforms, help educational organizations automate internal processes, simplify everyday tasks, and improve communication between participants in the educational process. These changes change the behavior and daily activities of all subjects. It also allows teachers to focus only on the students and not on the preparation and maintenance of day-to-day paperwork. In particular, it implements effective learning technologies to ensure that knowledge is available anytime, anywhere. It cannot be said that learning technologies are fundamentally new, we can say that traditional learning technologies are being improved and updated due to the pedagogical potential of modern digital technologies. The article contains theoretical studies on the importance of digital education, legal documents adopted for the development and informatization of education in the Republic of Kazakhstan, the elimination of information inequality and digitalization. The digital transformation of education has led to the study and emergence of new areas of traditional scientific disciplines focused on digital technologies, and has contributed to the development and improvement of the components of the methodological system of education. The impact of digital technologies on learning was described using the SAMR model. Our experience in improving the independent work of students and the methodological possibilities of using the chatbot service in teaching were demonstrated. The work was supported financially by the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan (grant no. AP09259047).

Keywords: informatization, digitization, legal documents, education, training, digital technologies, digital technologies in education, student self-study, chat bot, SAMR model, learning outcomes.

Basic provisions

In solving the research problem, the principles of a systematic approach to science and the sequence of research in the identification and solution of educational and methodological problems in the context of the digital transformation of education were followed.

Introduction

Higher pedagogical education in Kazakhstan today undoubtedly fulfills a responsible mission as one of the national priorities, since pedagogical education is a sphere that forms the intellectual potential of the nation. This is evidenced by the

comprehensive measures taken in this direction at the state level in the field of education development (Fig. 1).

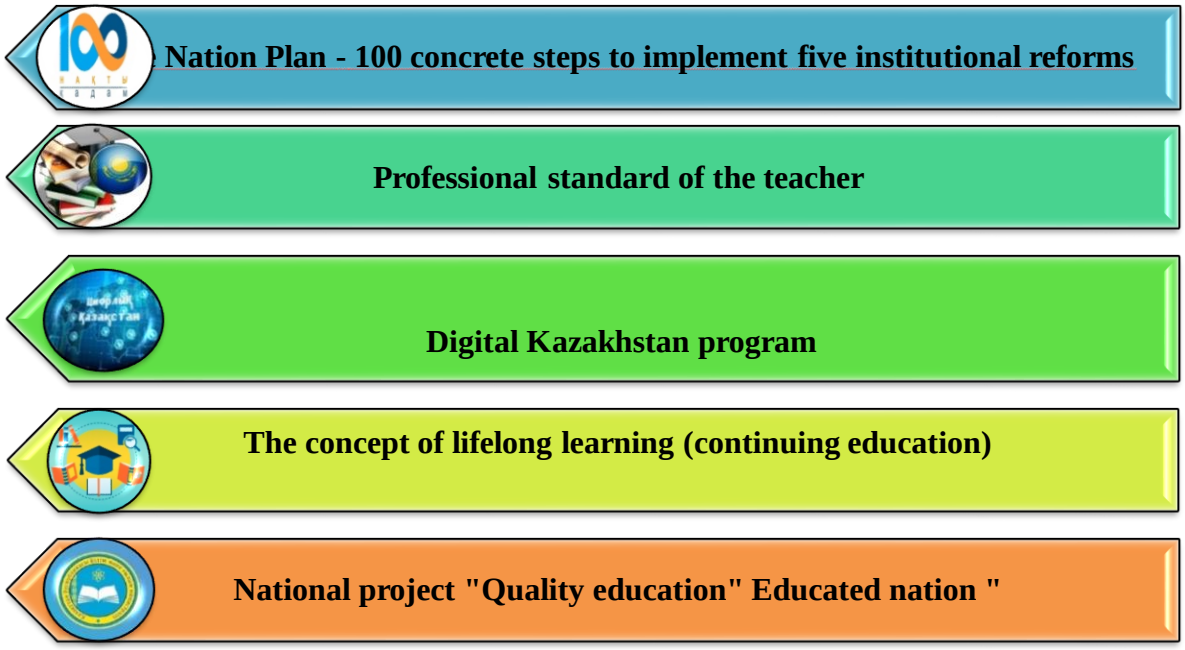

Figure 1- Documents for the development of education in the Republic of Kazakhstan

Materials and methods

It is known that since 1997 the country has adopted several regulations on informatization, reduction of information inequality, development of computer literacy, digitization, the formation of digital literacy. These documents were the direction of the country's aspiration to high-tech production (Table 1).

Table 1. Regulatory documents of the Republic of Kazakhstan on informatization, digitization (1997-2022)

№	*Name of regulatory document*	*Date of acceptance*	*Source*
1	*On the State Program of the President of the Republic of Kazakhstan on Informatization of the Secondary Education System of the Republic of Kazakhstan*	*Decree of the President of the Republic of Kazakhstan dated September 22, 1997 № 3645.*	*https://adilet.zan.kz/kaz/docs/N970003645_*
2	*On the Concept of informatization of the education system of the Republic of Kazakhstan for 2002-2004*	*Resolution by Government of the Republic of Kazakhstan August 6, 2001 31037*	*https://adilet.zan.kz/kaz/docs/P010001037_*
3	*About informatization*	*Law of the Republic of Kazakhstan dated May 8, 2003 12412-II*	*https://adilet.zan.kz/kaz/docs/Z030000412_*
4	*About approval of the Program on reduction of information inequality in*	*Resolution by Government of the Republic of Kazakhstan No. 1995 of October 13, 2006*	*https://adilet.zan.kz/kaz/docs/P060000995_*

	the Republic of Kazakhstan for 2007-2009		
5	*About informatization*	*Law of the Republic of Kazakhstan dated January 11, 2007 №217.*	*https://adilet.zan.kz/kaz/docs/Z070000217_*
6	*About informatization*	*Law of the Republic of Kazakhstan dated January 11, 2007 №217.*	*https://adilet.zan.kz/kaz/docs/Z1500000418*
7	*State program "Information Kazakhstan - 2020"*	*Resolution by Government of the Republic of Kazakhstan No. 1534 of December 4, 2012*	*https://adilet.zan.kz/kaz/docs/P1200001534*
8	*About approval of the state program "Digital Kazakhstan"*	*Resolution by Government of the Republic of Kazakhstan No. 827 of December 12, 2017*	*https://adilet.zan.kz/kaz/docs/P1700000827*

Education will be effective only if it meets modern requirements, so today education around the world must be able to meet the requirements of modern economy and society. In this regard, it is planned to improve the necessary abilities and competencies of individuals in connection with the acquisition of knowledge, their application and structuring.

In the modern world, the knowledge economy, which ensures the integration of science, industry, knowledge and ensuring the continuity of the acquisition and practical application of this knowledge, is relevant. These new trends in the development of civilization contribute to the strengthening of the demand for education.

The digital transformation of education has led to the study and emergence of new areas of traditional science focused on digital technologies (Table 2):

Table 2. New subject areas focused on the potential of digital technologies

№	Traditionally formed disciplines	A new subject area focused on the potential of digital technologies
1	Pedagogy	Digital pedagogy
2	Didactics	Digital didactics
3	Communication	Digital communication
4	Psychology	Internet psychology
5	Fundamentals of law	Fundamentals of digital law
6	Ecology	Digital ecology
7	Ethics	Digital ethics
8	Linguistics	Digital linguistics
	...	...

One of the most important subject areas for the education system is teaching, education, information transfer through digital technologies. In this regard, it is necessary to enrich the methods of teaching subjects using the huge potential of digital technologies in education.

Preparing schoolchildren for the use of digital technologies used to cover the upper grades, but now it is taught from the primary school. This is one of the steps in the formation of digital literacy of the younger generation.

One of the reasons for this is the growing potential of digital technologies in education and the general availability of digital technology. A modern educator must have general and professional digital skills, as well as skills to use the new opportunities of the digital economy, be confident in the digital environment of the Internet, be "aware of everything", be able to search for new forms of knowledge and data, their interpretation and operation [1].

Extensive measures have been taken in the country to integrate the domestic education system with world best practices, to develop education, and the main strategic and regulatory documents defining the laws of the digital transformation of education have been approved. The main feature of modern education is the increase in the pedagogical potential of digital technologies, which has led to its digital transformation.

Research results

In this article, we share our experiences in improving teaching methods.

2. Improving the independent work of students: In the context of increasing the information base of the Internet, it can be said that the forms and means of education are in the process of special development.

This is due to the fact that there are electronic libraries, streaming learning platforms, mobile applications and platforms for the creation and distribution of methodical digital learning content, etc., which offer a variety of opportunities in education. led to the digital transformation of educational activities.

In this regard, various teaching methods and opportunities are being studied and put into practice by methodologists and practitioners. However, in the performance of independent work, the use of information resources of the Internet, students have problems with the development of information culture, copyright, information security skills. In particular, one of the most important methodological problems is to improve the performance of independent work and testing of students.

In this regard, we used the method of posting practical work and independent work assignments on the personal website of the student in teaching the subject "Digital Technologies in Education". The student defended and evaluated the results of his practical work and independent work in the classroom through a presentation.

As a result, we were able to fully support e-learning by using the student's personal website. In addition, the creation of a personal website of the student and the placement of his practical work reports and independent work on the site had a positive impact on the formation of their professional skills, the skills of presentation of their work. The free Google application was used to create the site (Figure 1 a, b).

Figure 1a - A personal website page where the student offers practical work (https://sites.google.com/view/korkemm)

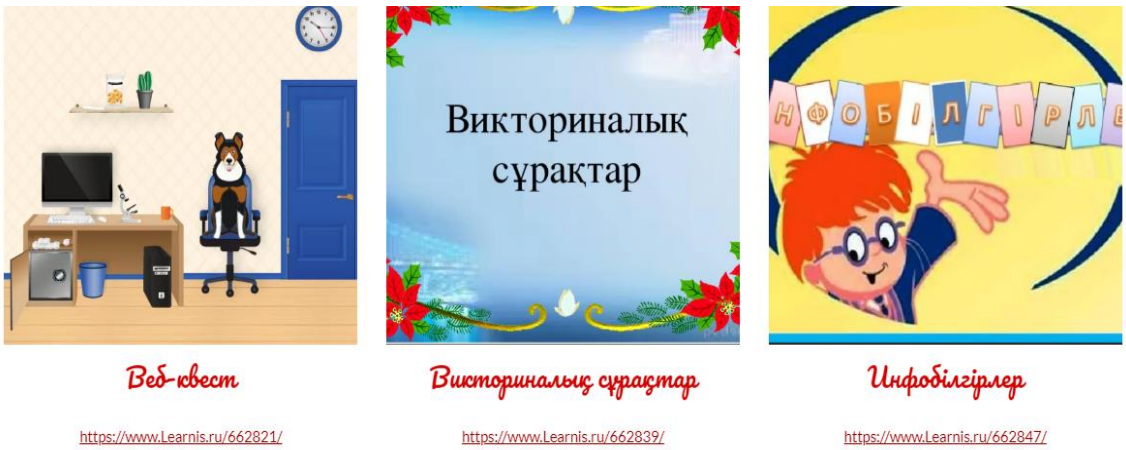

Figure 1b - Student's personal website (https://sites.google.com/view/namuna)

2. Methodological possibilities of using chat-bot services:

The term "chat bot" was coined in 1994 by Michael Mauldina (creator of Verbot, Julia) to describe conversation programs. Chat bots or virtual chats are used in chat systems for a variety of practical purposes, including customer service or gathering information. Chat-bot (from English chat - chat, bot - robot) is a computer program that "communicates" with a person through text or voice in ordinary language, interacting with it through a simple, intuitive interface.

A chat bot is a computer program (usually via the Internet) that imitates a live interlocutor and communicates with a person. Thanks to advances in artificial intelligence, chat bots are becoming a popular and preferred interaction option. Powerful machine learning algorithms have been developed, with the help of which the computer (chat bot) can conduct a dialogue with the end user with minimal intervention of the operator [2].

There are two types of chat bots:

1. Answer user queries based on a predefined set of rules and algorithms written in the program. These chat bots are the simplest and have significant limitations in their use;

2. Based on the principles of machine learning [3].

Currently, there are two ways to classify them, namely: the business classification of chatbot applications and the classification based on the technical component of the program. The business classification distinguishes three types of chatbots: chatbots, assistants, and question and answer chatbots. Conversational chatbots do not have a special function, they are designed to mimic human interaction, acting as an interlocutor capable of conducting simple conversations.

The main task of the helper chatbots is to create reports, tickets, order forms, etc. Gathering some information about a customer to create a service acts like a statement that fills in a certain set of fields. Question-answer chatbots are designed to answer simple user questions, replacing the process of finding answers to frequently asked questions with simple correspondence [4].

Chatbots have many advantages over using other resources and, in particular, software applications: bots are easier to install without using the memory of a device such as a smartphone, links to bots are easier to distribute, create and use, and much more [5].

According to the classification of Jonathan Grudin from the Microsoft Research Department, all bots can be divided into 3 large groups: simple bots for solving a problem, intelligent assistants and chat bots that can conduct a full-fledged dialogue (https://www.unisender.com).

The introduction of chat bots in online learning is the process of organizing two-way communication between a person and artificial intelligence in the "question-answer" format. A chatbot can become a full-fledged alternative to a dialogue with a real person, given the different options for the requests received.

This format of training is aimed at saving additional time for teachers, creating the necessary conditions for the quality and speed of preparing training materials. Such an interview, in which the student receives immediate answers to the questions asked, also has a positive effect on academic performance. An Intercom study found that in 2019, business leaders saved an average of $300,000 thanks to chatbots. Another advantage is that chatbots can be adapted to any industry. In our case, it will be education and upbringing.

Functions of educational chat bots:

1. Administrative support for teachers
2. Involve students in the search
3. Training
4. Feedback
5. Application of knowledge [6].

Automated services on messengers and services for creating chat bots.

- *Senler* - a platform for sending messages on Vkontakte.

- *Bothelp (formerly Whatshelp)* - Designed to connect Telegram, Viber, Vk, Facebook, WhatsApp.

- *Salesbot (AmoCRM)* - for connecting Telegram, Viber, Vk, Facebook, WhatsApp.

- *Smartsender* - Designed to connect Telegram, Viber, Vk, Facebook, WhatsApp.

- *Salebot* - In addition to the main messengers Telegram, Viber, Vk, Facebook, WhatsApp, you can connect Instagram, Odnoklassniki, Avito.

- *Flow.ai* - a platform that allows a teacher to create a bot with a simple, intuitive interface.

- *AndyRobot* - a popular English chat bot.

- *YTranslateBot* - chat bot translator working with Yandex technologies.

- *StepicBot* - a chat bot that helps you search for open online courses and training materials on the stepic website.

- *E-book-finder* - a chat bot for searching, downloading and selecting books.

In this regard, it was found that the implementation and further improvement of the chat-bot service to provide methodological assistance to teachers in the training course "Digital Pedagogy" for school teachers is effective in facilitating the work of teachers, referring to guidelines (Figure 3).

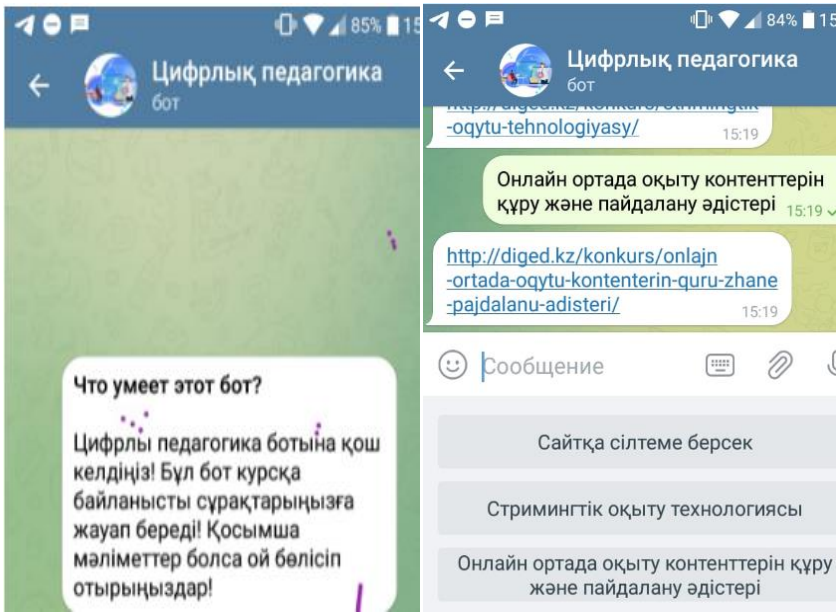

Figure 3 - "Digital pedagogy" methodical help chat-bot service

Discussions

The organization of students' own work and the use of chat-bot services have shown that they are very useful in the implementation of feedback in learning. In particular, the effectiveness of the teaching methods we have implemented under the SAMR model developed by Ruben Puentedura was determined. This is because a positive result was identified in four stages, including the SAMR model: 1) Substitution: Digital technologies replace traditional technologies (for example, a set of texts in Word). 2) Augmentation: digital technologies become a means of optimization in solving learning problems (for example, current or diagnostic or final assessment using mobile applications such as Google-forms, Kahoot, Plikers, etc.; 3) Modification: knowledge Significant functional changes in the transmission process and the interaction of its participants (for example, the use of combined learning technologies). 4) Transformation (Redefinition): setting and solving new pedagogical problems that could not be solved before.

Conclusion

In conclusion, the digital transformation of education requires high professional and methodological skills of teachers working at any level of education. Shows the importance of continuous discussion and improvement of teaching methods in the pedagogical professional environment. It also shows that the effective use of digital technologies in education is a powerful tool to ensure the integrated integration of components of teaching methods.

REFERENCES

[1] Колыхматов, В.И. Профессиональное развитие педагога в условиях цифровизации образования: учеб-метод. пособие. – СПб.: ГАОУ ДПО «ЛОИРО», 2020. – 135 с.

[2] Барбер М., Муршед М. Как добиться стабильного высокого качества обучения в школах. Уроки анализа лучших систем школьного образования мира //Вопросы образования. 2008. №3. –С. 7-60.

[3] Сухас У. Краткий обзор: Oracle Intelligent Bots-Чат-боты с искусственным интеллектом. - Корпорация Oracle, 2017. - 24 с.

[4] Катькало В.С. Корпоративное обучение для цифрового мира: учебное пособие / В.С. Катькало, Д.Л. Волкова. – 2-е изд., перераб. и доп., 2018. – 248 с.

[5] Горячкин Б.С., Галичий Д.А., Цапий В.С., Бурашников В.В., Крутов Т.Ю. Эффективность использования чат-ботов в образовательном процессе //E-Scio. - 2021. - №4 (55). –С. 529-551.

[6] Кузнецов В.В. Перспективы развития и использования чат-ботов в образовании //Успехи современной науки. - 2016. – Т.8. – № 12. – С. 16–19.

REFERENCES

[1] Kolykhmatov, V.I. Professional'noye razvitiye pedagoga v usloviyakh tsifrovizatsii obrazovaniya (Professional development of a teacher in the context of digitalization of education): ucheb-metod. posobiye – SPb.: GAOU DPO «LOIRO», 2020. – 135 s. [in Rus.]

[2] Barber M., Murshed M. Kak dobit'sya stabil'nogo vysokogo kachestva obucheniya v shkolakh. Uroki analiza luchshikh sistem shkol'nogo obrazovaniya mira (How to achieve a stable high quality of education in schools. Lessons from analyzing the best school systems in the world). //Voprosy obrazovaniya. - 2008. - №3. –S. 7-60. [in Rus.]

[3] Sukhas U. Kratkiy obzor: Oracle Intelligent Bots Chat-boty s iskusstvennym intellektom (Brief Review: Oracle Intelligent Bots- Chatbots with artificial intelligence). - Korporatsiya Oracle, 2017. - 24 s. [in Rus.]

[4] Kat'kalo V.S. Korporativnoye obucheniye dlya tsifrovogo mira (Corporate training for the digital world): uchebnoye posobiye /V.S. Kat'kalo, D.L. Volkova. – 2-ye izd., pererab. i dop., 2018. – 248 s. [in Rus.]

[5] Goryachkin B.S., Galichiy D.A., Tsapiy V.S., Burashnikov V.V., Krutov T.YU. Effektivnost' ispol'zovaniya chat-botov v obrazovatel'nom protsesse (Efficiency of using chatbots in the educational process) //E-Scio. - 2021. - №4 (55). –S. 529-551. [in Rus.]

[6] Kuznetsov V.V. Perspektivy razvitiya i ispol'zovaniya chat-botov v obrazovanii (Prospects for the development and use of chatbots in education) //Uspekhi sovremennoy nauki. - 2016. – T.8. – № 12. – S. 16–19. [in Rus.]

БІЛІМ БЕРУДІҢ ЦИФРЛЫҚ ТРАНСФОРМАЦИЯСЫ: ОҚУ-ӘДІСТЕМЕЛІК ПРОБЛЕМАЛАР МЕН ОЛАРДЫ ШЕШУДІҢ ЖОЛДАРЫ

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Аңдатпа. Компьютерлердің даму тарихы мен жаппай компьютерлендіру үдерісінен бастау алып, Индустрия 4.0 жағдайында ғылыми ұғым ретінде іргелі зерттеулер мен көпжақты талқылаулардың өзегі болған цифрландырудың негізін интернеттің жылдам дамуы мен мобильді коммуникация мүмкіндіктері құрайды. Білім берудегі өзара әрекеттесу платформалары сияқты жаңа құралдар мен цифрлық технологиялар білім беру ұйымдарына ішкі процестерді автоматтандыруға, күнделікті тапсырмаларды жеңілдетуге және білім беру үдерісіне қатысушылар арасындағы байланысты жақсартуға көмектеседі. Бұл өзгерістер барлық субъектілердің мінез-құлқы мен күнделікті қызметін өзгеріске ұшыратады. Сонымен қатар бұл оқытушыларға күнделікті құжаттарды дайындауға және басқаруға емес, тек білім алушыларға назар аударуға мүмкіндік береді. *Атап айтқанда, білімнің кез-келген уақытта кез-келген жерде қолжетімділігін қамсыздандырудың тиімді оқыту технологияларын іске асырады. Бұл оқыту технологияларын түбегейлі жаңа деп айтуға болмайды, дәстүрлі оқыту технологияларының заманауи цифрлық технологиялардың педагогикалық әлеуеті арқылы жетілдірілуі әрі жаңара толығуы деп тұжырымдауға болады. Мақалада Қазақстан Республикасында білім беруді дамыту мен ақпараттандыру, ақпараттық теңсіздікті жою және цифрландыру бойынша қабылданған құқықтық-нормативтік құжаттар туралы, цифрлық білім берудің маңыздылығы бағытында теориялық зерттеулер мазмұндалған.* Білім берудің цифрлық трансформациясы дәстүрлі ғылыми пәндік саланың цифрлық технологияларға бағытталған жаңа салаларының зерттелуі мен пайда болуына әкелді әрі оқытудың әдістемелік жүйесі компоненттерінің дамуы мен жетілдірілуіне ықпал етті. SAMR моделін қолдана отырып, цифрлық технологияның оқытуға әсері сипатталды. Білім алушылардың өзіндік жұмыстарын жетілдіру мен оқытуда чат-бот қызметін пайдаланудың әдістемелік мүмкіндіктері туралы тәжірибелеріміз көрсетілді. Бұл зерттеуді Қазақстан Республикасының Білім және ғылым министрлігінің Ғылым комитеті қаржыландырды (грант № AP09259047).

Тірек сөздер: ақпараттандыру, цифрландыру, нормативтік-құқықтық құжаттар, білім беру, оқыту, цифрлық технологиялар, білім берудегі цифрлық технологиялар, білім алушының өзіндік жұмысы, чат-бот, SAMR моделі, оқыту нәтижелері.

ЦИФРОВАЯ ТРАНСФОРМАЦИЯ ОБРАЗОВАНИЯ: УЧЕБНО-МЕТОДИЧЕСКИЕ ПРОБЛЕМЫ И ПУТИ ИХ РЕШЕНИЯ

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Аннотация. Начиная с истории компьютеров и процесса массовой компьютеризации, быстрое развитие Интернета и возможности мобильной связи формируют основу цифровизации, которая является ядром фундаментальных исследований и многосторонних дискуссий как научной концепции в Индустрии 4.0. Новые инструменты и цифровые технологии, такие как платформы для сотрудничества в области образования, помогают образовательным организациям автоматизировать внутренние процессы, упростить повседневные задачи и улучшить коммуникацию между участниками образовательного процесса. Эти изменения меняют поведение и повседневную деятельность всех субъектов. Это также позволяет учителям сосредоточиться только на учениках, а не на подготовке и ведении повседневной бумажной работы. В частности, он внедряет эффективные технологии обучения для обеспечения доступности знаний в любое время и в любом месте. Нельзя сказать, что технологии обучения являются принципиально новыми, можно сказать, что традиционные технологии обучения совершенствуются и обновляются благодаря педагогическому потенциалу современных цифровых технологий. Статья содержит теоретические исследования о важности цифрового образования, нормативно-правовые документы, принятые для развития и информатизации образования в Республике Казахстан, устранения информационного неравенства и цифровизации. Цифровая трансформация образования привела к изучению и появлению новых областей традиционных научных дисциплин, ориентированных на цифровые технологии, и способствовала развитию и совершенствованию компонентов методологической системы образования. Влияние цифровых технологий на обучение было описано с использованием модели SAMR. Был продемонстрирован наш опыт улучшения самостоятельной работы студентов и методические возможности использования сервиса чат-ботов в обучении. Работа выполнена при финансовой поддержке Комитета по науке Министерства образования и науки Республики Казахстан (грант № AP09259047).

Ключевые слова: информатизация, оцифровка, правовые документы, образование, обучение, цифровые технологии, цифровые технологии в образовании, самообучение учащихся, чат-бот, модель SAMR, результаты обучения.

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